

**THE OFFICE ACTION**

In the Office Action issued on December 28, 2004, the Examiner rejected claims 3 and 7 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter. The Examiner rejected claims 1-4 and 7 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,995,173 to Barberi et al. ("Barberi") in view of U.S. Patent No. 5,434,685 to Pirs et al. ("Pirs"). Finally, the Examiner further rejected claims 5 and 6 under 35 U.S.C. §103(a) as being unpatentable over Barberi in view of Pirs and further in view of U.S. Patent No. 4,590,146 to Wallbillich ("Wallbillich").

**REMARKS**

Applicants have carefully considered the Office Action issued on December 28, 2004. Applicants respectfully request reconsideration of the application in light of the above amendments and the following comments.

**A. The Pending Claims Comply with 35 U.S.C. §112**

The Examiner rejected claims 3 and 7 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter. Specifically, the Examiner objected to the use of the term "structure factor". The Examiner believed that by not defining the term in the specification, the meaning of the term was not clear and amenable to multiple meanings.

In making this rejection, the Examiner states that "upon review of the art of liquid crystals, it appears to the Examiner that 'structure factor' may have multiple possible meanings...Because there is no clear definition in the art as to what a structure factor is, it is not currently possible to determine what Applicant means by 'structure factor'. Accordingly, the claims are rendered indefinite."

Again, Applicants are somewhat puzzled by this rejection, as the term "structure factor" has a defined meaning in the field of diffraction gratings. The Examiner states that upon the Applicants' urging, she searched "the entire Patent Office data base (including all arts) finding only one reference about 'structure factor'". Applicants are amazed at this assertion, as a quick search of the Internet using a common search engine and search terms relating to structure factor and

diffraction gratings resulted in hundreds of various pages discussing this term. However, in an effort to assist the Examiner in her understanding, Applicants hereby submit several references describing the meaning of the term "structure factor", labeled as Appendices A-B. These references include a definition for the term "structure factor" in the *McGraw-Hill Dictionary of Scientific and Technical Terms* as well as a representative discussion of "structure factor" in the specific context of x-ray diffraction for a crystal from an internet web page (<http://www.gly.uga.edu/schroeder/geol6550/CM05.html>). The Examiner will see that, although best expressed in mathematical terms, the structure factor is essentially the sum of the amplitudes of scattered radiation from a diffracting material. Applicants urge the Examiner to review these submissions to familiarize herself with the meaning of this term, as it presents an additional point of patentability for the present invention. Applicants request withdrawal of this rejection based on the standardized definition for this term in the field of diffraction gratings.

**C. The Pending Claims Are Patentable Over Barberi in View of Pirs**

The Examiner rejected claims 1-4 and 7 under 35 U.S.C. §103(a) as being unpatentable over Barberi in view of Pirs. Applicants respectfully traverse.

Barberi is directed to a display device based on nematic liquid crystals with positive dielectric anisotropy between two transparent plates, at least one of which defines a quasi-bistable anchoring. By applying a temporary electric field to the cell, the anchoring is broken, allowing localized orientations of the liquid crystal molecules corresponding to the preferred orientation of the quasi-bistable anchoring. Switching is effected between an ordered hybrid texture and a disordered state, which is stabilized by the quasi-bistable anchoring. Using two crossed polarizers, this configuration allows for the non-transmission of light when the hybrid state is present while when an array of defects is present, light is transmitted (col. 3, lines 10-20). Nowhere does Barberi disclose or suggest the presence or use of a diffraction grating as disclosed and claimed in the present application.

Similarly, Pirs is directed to a ferroelectric liquid crystal cell for use in display devices and optical switching devices (col. 1, lines 8-12 and col. 7, lines 45-48). Pirs is specifically directed to cells utilizing ferroelectric liquid crystals, which have advantages over cells employing nematic liquid crystals (such as in Barberi) in such

applications (col. 1, lines 15-26). Pirs discloses the use of polymerizable microdroplets or globules randomly interspersed in the liquid crystal. The monomer droplets are polymerized to three dimensional structures, disposed predominantly on the cell walls. Pirs notes that the resulting cell is characterized by high transparency, and clear contrast (col. 7, lines 57-59). As with Barberi, Pirs fails to disclose or suggest the presence or use of a diffraction grating as disclosed and claimed in the present invention. A proposed combination of Barberi and Pirs fails to suggest the present invention for at least the following reasons.

First, there is no motivation to combine Barberi with Pirs. Here, there is no motivation to combine the teachings of the references since they actually teach away from such a combination and, in fact, present incompatible technologies.

In this respect, prior art references must be considered in their entirety, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 220 USPQ 303 (Fed. Cir. 1985). Here, the formation of "convective cells" as described in Barberi are due to the charging of the nematic liquid crystal by an externally applied electric field, which in turn induces convective fluid movement and resulting hydrodynamic moments on the nematic surface directors.

Pirs, on the other hand, utilizes polymer droplets or globules to freeze the arrangement of the liquid crystal, preventing the flow of liquid crystal and locking in the molecular ordering of the liquid crystals (col. 2, lines 29-36). As described above, this provides superior performance in the polymer stabilized displays of Pirs due, in part, to their structural bistability and resistance to mechanical disturbances. One practicing the invention of Barberi would not be motivated to combine the teachings therewith with those of Pirs, or vice versa.

Applicants are at a loss as to what type of combination of Barberi and Pirs the Examiner is contemplating. Combining the teachings of the two references would not even be considered by one skilled in the art due to the inherent incompatibility of the two references. The use of a polymer network of various structural morphologies as taught by Pirs in the invention of Barberi would prevent or at least severely impede the creation of surface defects due to the Felici effect as taught by Barberi. That is, the use of a polymer network would actually work against the invention of Barberi as it would hinder the hydrodynamic instabilities and localized orientations required for the proper functioning thereof due to the volume and flow stabilization

afforded by the polymer.

The Examiner will appreciate that such a combination would prevent Barberi from functioning as described. The "freezing" of the liquid crystal orientation of Pirs and locking in of the molecular order would prevent the invention of Barberi from functioning, as Barberi requires the hydrodynamic movement of the nematic surface directors. In the plainest of terms, Barberi requires the movement and reorientation of liquid crystal molecules in his cell, whereas Pirs describes a polymer network that essentially freezes the location and movement of the liquid crystal. Such a combination would be incompatible.

Here the Examiner has clearly found references allegedly disclosing the elements of the present invention, and proposed a combination based on these references even though they provide no suggestion for such a combination, and indeed could most likely not be combined. This is a classic example of impermissible hindsight reconstruction.

In attempting to provide support for the proposed combination, the Examiner states, "it would have been obvious to one of ordinary skill in the art of liquid crystals at the time the invention was made to modify Barberi in view of Pirs so that the properties of the liquid crystal cell can be maintained, susceptibility to shock is reduced, the distance between the cell walls is maintained, and the flow of liquid crystals within the cell is prevented." (Office Action, page 5).

Where is the Examiner getting the concept that Barberi desires to prevent the flow of liquid crystal within the cell? In fact, Applicants submit that it is the very mobility of the liquid crystal in Barberi that allows for the breaking of the plate anchoring and the reorientation of the liquid crystal molecules. That is, as discussed above, it is the movement of the liquid crystal molecules that produces the hydrodynamic instabilities and allows for the breaking of the surface alignment of the plate. The use of a polymer network would hinder such movement. Thus, there is absolutely no motivation to combine the teachings of Barberi and Pirs.

Second, even if the references could somehow be combined, they would still not render the present claims obvious under §103.

Here, neither Barberi nor Pirs is within the present field of endeavor nor are they reasonably pertinent to the particular problem addressed by the present invention. In this respect, neither Barberi nor Pirs is directed to the field of diffraction gratings. That is, Barberi and Pirs are both directed to liquid crystal cells for display

devices. As detailed above, these references are simply not pertinent to the particular problem with which the present invention is concerned. Thus, even assuming for purposes of argument that all of the limitations of the present claims can be found by culling from the prior art parameters to fit the claimed invention, it is improper to pick and choose individual elements from assorted prior art references to recreate the claimed invention without some motivation to do so. *Symbol Technologies, Inc. v. Opticon, Inc.*, 19 USPQ2d 1241 (Fed. Cir. 1991).

With further respect to claim 2, such a proposed combination does not disclose or suggest wherein the convective rolls are arranged with a grating spacing approximately twice the separation distance between the cell walls. With regard to claim 3, the proposed combination inherently does not disclose a structure factor or its adjustment, which is a diffraction grating property, since the proposed combination does not disclose or suggest a diffraction grating. The Examiner's assertion that the "coils of liquid crystal are arranged with a structure factor and that the structure factor (meaning possibly the shape of the coils, thermal-mechanical factors of the coils, etc.) is adjusted because of the electrical supply means" is completely insufficient to present a prima facie case of obvious, since the Examiner has assumed a completely incorrect interpretation of the term "structure factor". With regard to claims 4-7, the proposed combination does not disclose a polymer network bounded by the convective roll structure.

For at least these reasons, applicants submit that the proposed combination of Barberi and Pirs is inappropriate and fails to render the present claims unpatentable.

**D. The Pending Claims Are Patentable Over Barberi in View of Pirs and Further in View of Wallbillich**

The Examiner rejected claims 5 and 6 under 35 U.S.C. §103(a) as being unpatentable over Barberi in view of Pirs and further in view of Wallbillich. Applicants respectfully traverse.

First, there is no motivation to combine the teachings of Wallbillich with Barberi or Pirs. Wallbillich is directed to the addition of a compound to stabilize a photopolymerizable mixture and prevent it from spontaneously polymerizing. Barberi and Pirs are directed to liquid crystal cells for use in displays as discussed above.

Wallbillich relates to completely different subject matter than Barberi and Pirs. One skilled in the art of liquid crystal cells for use in displays would not be motivated to combine the teachings of Barberi or Pirs with Wallbillich.

In support of the rejection, the Examiner stated "it would have been obvious to one of ordinary skill in the art of liquid crystals at the time the invention was made to modify Barberi in view of Wallbillich to prevent spontaneous thermal polymerization." This conclusion is incorrect for several reasons. The problem of spontaneous thermal polymerization is limited to water-soluble or water dispersible mixtures, consisting essentially of a base polymer, a polymerizable ethylenically unsaturated compound, and an initiator, as detailed in Wallbillich (col. 1, lines 5-10). Barberi does not contain ANY polymerizable material and therefore the proposed combination is simply meaningless. Pirs only discloses polymerizable monomers such as acrylates and the like. It does not disclose the mixtures of Wallbillich. Therefore, there is no need to stabilize the monomers of Pirs as detailed by the procedure of Wallbillich. Thus, there is no motivation to combine Wallbillich with either Pirs or Barberi. The Examiner completely failed to address this argument submitted in the prior response so the Applicants reiterate their position here.

Even if the references could be combined, they would still not disclose or suggest all the elements of the present claims. The Examiner appears to be confused in her understanding of the present claims. Claim 5 depends on claim 4 and recites that the polymerizable mixture contains an initiator that is activated during the step of stabilizing the convective roll structures by forming a polymer network. The polymerizable mixture itself is not stabilized (as in Wallbillich). Rather, it is the convective rolls that are stabilized by the formation of a polymer network. Claim 6 merely recites wherein the initiator is a photoinitiator and the initiation of polymerization is photoinitiation. Again, however, the polymerizable mixture is not stabilized, only the convective rolls are. For at least these reasons, the proposed combination fails to render the present claims obvious.

### **CONCLUSION**

In view of the foregoing comments, Applicants submit that claims 1-7 are in condition for allowance. Applicants respectfully request early notification of such allowance. Should any issues remain unresolved, the Examiner is encouraged to

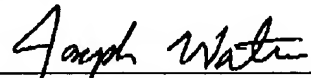
contact the undersigned to attempt to resolve any such issues.

If any fee is due in conjunction with the filing of this response,  
Applicants authorize deduction of that fee from Deposit Account 06-0308.

Respectfully submitted,

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Date: March 22, 2005

  
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Attachments: Appendices A and B

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